APPARATUS AND METHOD FOR DRIVEWAY GUTTER

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The invention pertains to the field of driveways. More particularly, the invention pertains to methods and apparatus for improving driveway gutters and for paving driveways.

DESCRIPTION OF RELATED ART

Asphalt is widely used for paving, roofing, paints and varnishes. In modern road construction, asphalt is a material of choice, due to its ability to provide a smooth surface for travel, while also providing a surface rough enough for tire traction. This sticky substance is the glue that holds pavements together. Its relative cost effectiveness, durability and ease to work with provide added benefits that increase its desirability.

Asphalt, in a strict sense, is the black, sticky substance that is produced by petroleum refineries, obtained as a residue or by-product of processing certain petroleum compositions. It is essentially the residue remaining after all the more valuable fractions of a barrel of oil have been removed, such as gasoline, fuel oil, diesel fuel, aviation fuel and others. Asphalt is insoluble in water but soluble in gasoline. It melts on heating and burns with a smoky flame. Most native or naturally occurring asphalt is a residue in the form of evaporated petroleum.

The term asphalt, when used to describe a road, such as an asphalt road, generally is referred to in the industry as hot mix asphalt (HMA) pavement. Hot mix asphalt is a combination of aggregates and asphalt cement. Typically, asphalt is only about eight percent, by weight, of the HMA pavement, while aggregates typically account for about ninety-two percent, by weight, of the mixture that goes into the pavement. The aggregates usually are various sized stones, dust and/or sand. Basically, the aggregates can be any hard, inert materials used for mixing in granulated fragments (*e.g.*, crushed stone). For the purposes of this patent, the term asphalt shall be used in conjunction with the type of asphalt material referred to in road construction that is used for pavements, such as hot mix asphalt (HMA) and the like.

Paving machines are well known in the art and commonly are employed in the laying of asphalt roadway mat, such as for roads and driveways. The typical paving

machine employs a "floating screed" for spreading and compressing the asphalt material to form a smooth surfaced roadway mat. The floating screed type paving machine typically is a self-propelled tractor unit providing a storage means for receiving and containing a discreet quantity of loose asphalt material and a material flow means for conveying the asphalt material to the roadbed, where the loose asphalt material is then displaced laterally in front of the floating screed. As the paving machine progresses along the roadbed, the floating screed engages the loose asphalt material, plowing under and compressing the asphalt material into the desired roadway mat.

It is common to use a floating screed of fixed width, for example, typically on the order of eight feet or ten feet in width. Further, the efficiency of the paving machine can be increased and the number of trips required to generate a road surface can be decreased by employing a floating screed having an operator selectable width. This may be accomplished by providing a series of extensions, which may be affixed to the main body of the floating screed to a predetermined fixed width. It is known to provide endgates on the outer, distal ends of the screed extensions to ensure that the loose asphalt material disposed in front of the screed extensions is not merely shunted aside beyond the width of the floating screed.

The means most commonly used for providing the lateral disposition of the loose asphalt material is a flighted auger providing two oppositely directed flights from the centerline of the paving machine to provide disposition of an equal amount of asphalt material toward the outer edges of the floating screed. While this means has proved to be generally satisfactory, a difficulty exists in ensuring that the appropriate desired amount of loose asphalt material is provided to the screed extensions. This problem is exacerbated by the fact that paving machines often are operated under less than ideal conditions, and it often is necessary to operate one screed extension at a different width than the other screed extension, as obstacles are passed or width changes in the roadway mat must be accommodated as the paving machine moves forward.

In the operation of current paving machines, the screed operator must cause a suitable flow of loose asphalt material to the auger to ensure that a sufficient amount of aggregate will cascade across the floating screed to reach and fill the area in front of the floating screed to the minimum requisite depth required for the pavement mat. However, the screed operator must be possessed of a substantial amount of skill and expertise to accomplish this result, due to the fact that the primary means of controlling the amount of aggregate available to the floating screed is in the conveyance means from the tractor unit

of the paving machine. The combination of foregoing problems make certain paving operations difficult, particularly the paving of driveways and around curbs or gutters.

An improved arrangement of the floating screed includes one or more, typically two, screed extensions, which are slidingly attached to the main body of the floating screed. These screed extensions typically are connected to a linear power source, such as a bi-directional hydraulic cylinder or other similar activator, which is selectively operable in response to controls disposed at the operator's control station. This permits the operator to control the position of the screed extensions in response to changing requirements as the paving machine progresses. For example, this permits the screed operator to accommodate obstacles in the path of the paving machine, such as sewer drains and manhole covers, and also to permit overwidth paving of the road surface to accommodate driveway entrances and other similar areas, where overwidth paving of the roadway mat is desired.

Slip form paving machines of various configurations have been developed to address the problems inherent in forming curbs and gutters or culverts. For example, U.S. Pat. No. 3,223,006 shows a machine for forming integral sidewalks and curbs, which uses a slip form for the formation of these sidewalks and curbs. Other apparatus in the art is exemplified by a curb-forming machine shown in U.S. Pat. No. 3,053,156, which has a pair of wheels at the rear thereof that can be laterally moved across the width of the machine for accommodating different form locations and cross section shapes. Such slip form paving machines commonly are used to form sidewalks, curbs and culverts or gutters for collection and diversion of storm drainage and similar runoff.

Also known are various configurations of speed bumps, either integral with or permanently or reversibly affixed to the roadway, which commonly are used as a physical obstruction to encourage drivers to proceed slowly, such as in parking lots or other areas with high pedestrian traffic. For example, U.S. Patent No. 6,309,137 describes a portable speed bump, for use in limiting the speed of vehicles that are traveling on a road, formed from a plurality of elongated speed bump modules. Each module has a cross-section that has at the most, a low slope from the outer edges toward the mid-line and a substantially increased slope proximate the module mid-line, a length of at least two feet, a width of at least one foot, and a height of at least one inch. Each module has an upper surface which has a concave slope region from outer edge to middle section and a convex middle section. Anti-skid elements can extend from the planar lower surface, whereby lateral movement of said speed bump is resisted. The elements can be a plurality of substantially parallel, outwardly angled anti-skid fingers.

U.S. Patent No. 6,174,103 describes a removable and portable speed bump system using a flexible connector such as a chain or cable lying transversely across the roadway, and a number of generally triangular, or arch-shaped, spaced-apart bump modules disposed on the speed bump for which cars must slow down to cross. The speed bump modules are either fastened to the flexible connector or molded directly onto the flexible connector. The flexible connector is attached to a connecting anchor fixed into the road curb or road shoulder of a roadway. The opposite end of the flexible connector is fastened to a clasp or spring-loaded link set at a second point transversely across the roadway from the connecting anchor. The speed bump modules are configured to enable stacking in a compact fashion, for example, in a special container located on the side of the roadway.

One problem commonly encountered by screed operators when paving, particularly driveways ,is that it is difficult for the operator to control the paving near the end of the driveway, where it meets the road. For example, driveways typically slope uphill or downhill toward the end thereof, sloping toward the road, and also often require overwidth paving of the driveway surface near the end thereof to accommodate the driveway entrance. Further, driveways that include culverts or gutters on either side or at the intersection with the roadway, for example, present special problems for the screed operator. For example, it is particularly difficult to pave the junction of a roadway and driveway, especially when the roadway includes a gutter, as this presents a plurality of surfaces of substantially varying height at the end of the driveway. This causes undue wear and tear on the paving machines and makes it more difficult for the operator to pave the driveway at the junction between the driveway and roadway, where the gutter intersects the two.

The typical driveway gutter also presents problem for drivers, frequently causing drivers to slow down upon approaching the transition between the roadway and the driveway, and often causing undue bumping of the vehicle upon entering or exiting the driveway, because of the gutter. In particular, where the gutter or curb comprises concrete, which is very hard, and the driveway surface comprises asphalt, which is relatively soft, this difference in material strength results in damage to the driveway, due to undue wear from vehicles entering the driveway, bumping the gutter and subsequently pounding on the driveway pavement.

SUMMARY OF THE INVENTION

The present invention provides methods and apparatus for improved driveway gutters and improved methods for paving driveways and similar structures.

One embodiment provides a method and apparatus for improving a driveway, comprising a pre-fabricated speed bump in contact with a culvert or gutter of the driveway.

Another embodiment provides a method and apparatus for improving a driveway, comprising the steps of providing a pre-fabricated speed bump in contact with a culvert or gutter of the driveway, and paving over the driveway and the speed bump.

Another embodiment provides a method and apparatus for improving a driveway, comprising the steps of providing a pre-fabricated speed bump in contact with a culvert or gutter of the driveway, paving over the speed bump, and then removing the speed bump.

BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 shows a speed bump of the type suitable for the present invention.

Fig. 2 shows a pre-fabricated speed bump in contact with a driveway gutter in accordance with the invention.

Fig. 3 shows an improved driveway gutter mat, according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides methods and apparatus for improved driveway gutters and improved methods for paving driveways and similar structures. One embodiment provides a method and apparatus for improving a driveway, comprising a pre-fabricated speed bump in contact with a culvert or gutter appurtenant to said driveway.

The speed bump preferably is of the prefabricated type that is commonly available. For example, rubber speed bumps are preferred because they are extremely durable; they will not rot, chip, or corrode and are UV-resistant. They typically are made from solid, rugged, recycled rubber tires and are built to withstand in excess of 2,500 psi of pressure.

Referring now to Figure 2, a pre-fabricated speed bump is shown in contact with a driveway gutter. The speed bump is placed in the driveway gutter, thereby smoothing the transition between the driveway and the roadway. This improves driving by decreasing bumps and the inherent wear and tear on vehicles entering and exiting the driveway. The pre-fabricated speed bump is placed in the gutter optionally either right-side up or up-side down, each having its advantages in particular circumstances, as will be apparent to one skilled in the art. For example, where the driveway gutter is substantially similar in

contour to the speed bump, the pre-fabricated speed bump optionally is placed up-side down in the gutter, thereby leveling the driveway entry.

The pre-fabricated speed bumps optionally are installed permanently or semi-permanently, using a wide variety of well know fasteners, or they can be used as a portable gutter mat that is not fastened to the surface. They may be easily removed and re-installed to facilitate snow plowing or resurfacing. The pre-fabricated speed bumps are used individually, or optionally multiple units can be used to assemble a variety of configurations. In addition to the gutter typically found at the end of a driveway, the speed bumps also can be used in gutters in other locations around the driveway.

The preferred prefabricated speed bumps typically conform to the contour of the pavement, and optionally include built-in reflectors or are manufactured in a particular color, pattern or combination thereof to increase visibility. Optionally, the speed bumps include one or more channels (*e.g.*, about 1-2" in diameter) that run along the bottom side to allow for cables, pipes, *etc.* The channels also allow water to drain through the speed bump, which is particularly advantageous when used as a gutter mat as it allows water to pass along the course or the gutter. Optionally, the ends of the channels are covered with a screen or other straining means to prevent debris from entering the channels and blocking the gutter course.

EXAMPLE 1: Dimensions: 72" long x 12" wide x 2.5" high.

EXAMPLE 2: Dimensions: 72" long x 10" wide x 2.5" high.

Another embodiment provides a method and apparatus for improving a driveway, comprising the steps of providing a pre-fabricated speed bump in contact with a culvert or gutter appurtenant to said driveway, and paving over said speed bump. For example, a pre-fabricated speed bump is provided as in the first embodiment and installed permanently or semi-permanently, and then the driveway is paved. Optionally the entire driveway and speed bump are paved-over, leaving a smooth transition between the driveway and the roadway. This improves driving by decreasing bumps and the inherent wear and tear on vehicles entering and exiting the driveway. Further, the invention facilitates convenient paving of driveways; it solves the problem of the plurality of surfaces of substantially varying height at the end of the driveway making paving difficult for the operator and causing wear and tear on the paving machine.

The pre-fabricated speed bump is placed in the gutter optionally either right-side up or up-side down, each having its advantages in particular circumstances, as will be

apparent to one skilled in the art. For example, where the driveway gutter is substantially similar in contour to the speed bump, the pre-fabricated speed bump optionally is placed up-side down in the gutter, thereby leveling the driveway entry. Surprisingly, however, when the speed bump is placed right-side up in the gutter, the speed bump provides a damping effect, flexing just enough when a vehicle rolls over it, thereby smoothing the ride over the gutter. The speed bumps are used individually, or optionally multiple units can be used to assemble a variety of configurations. In addition to the gutter typically found at the end of a driveway, the speed bumps also can be used in gutters in other locations around the driveway, particularly wherever paving is desired.

Optionally, the speed bumps include one or more channels (*e.g.*, about 1-2" in diameter) that run along the bottom side to allow for cables, pipes, *etc.* The channels also allow water to drain through the speed bump, which is particularly advantageous when used as a gutter mat as it allows water to pass along the course or the gutter. Optionally, the ends of the channels are covered with a screen or other straining means to prevent debris from entering the channels and blocking the gutter course.

Another method for paving a driveway according to one embodiment includes the steps of preparing the surface, placing one or more speed bumps in the gutter, and then paving over the driveway and the speed bump. Optionally, if keeping the gutter is desirable, the speed bump can then be removed after paving. Thus, the invention facilitates convenient paving of driveways; it solves the problem of the plurality of surfaces of substantially varying height at the end of the driveway making paving difficult for the operator and causing wear and tear on the paving machine, while in the end leaving the driveway gutter intact. Further, it has been discovered that coating the speed bump with a solvent, such as, for example, kerosene, prior to paving facilitates removal of the new pavement layer covering the speed bump, and subsequently the speed bump itself below.

Accordingly, it is to be understood that the embodiments of the invention herein described are merely illustrative of the application of the principles of the invention. Reference herein to details of the illustrated embodiments is not intended to limit the scope of the claims, which themselves recite those features regarded as essential to the invention.